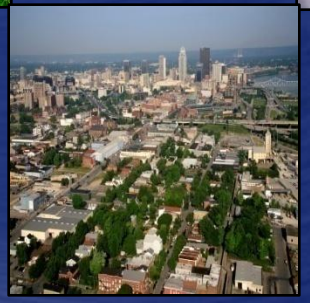
apcd
Louisville Metro
Air Pollution Control District

Managing Buildings and Grounds for Air Quality

METRO Louisville



May 25, 2010

Why Buildings and Grounds?

Everyday activities and operations contribute to air pollution

- Maintenance
  - Painting, paving, roofing, etc.
  - Gas-powered grounds keeping equipment
- Operations
  - Energy Use
  - Fleets and other vehicle use

Metro Louisville

Summer Air Quality Issues

- The summer season compounds Louisville's air quality issues
  - Sunlight and stagnant air masses increase favorable conditions for ozone and fine particle formation
- Careful timing of emission-generating projects can help reduce pollution
  - Plan projects from October to March
  - Plan activities for the coolest parts of the day (morning and evening)
  - Adjust project schedules and daily activities for air quality alerts

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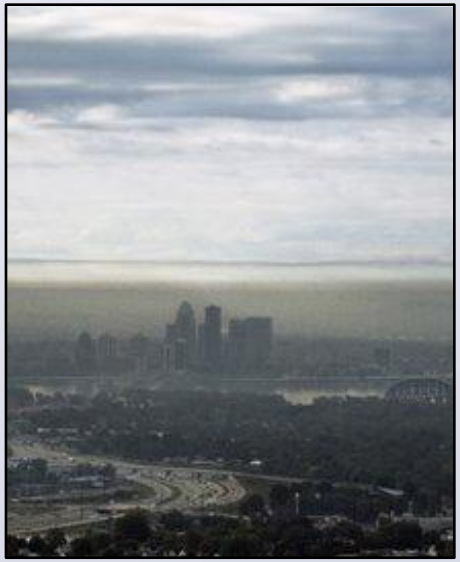
Ozone



- What is it?
  - Created through chemical reaction:

    $NOx + VOC + Sunlight = O_3$

- Where does it come from?
  - Gasoline engines
  - Gasoline and other petroleum vapors
  - Paint and solvents
  - Natural sources

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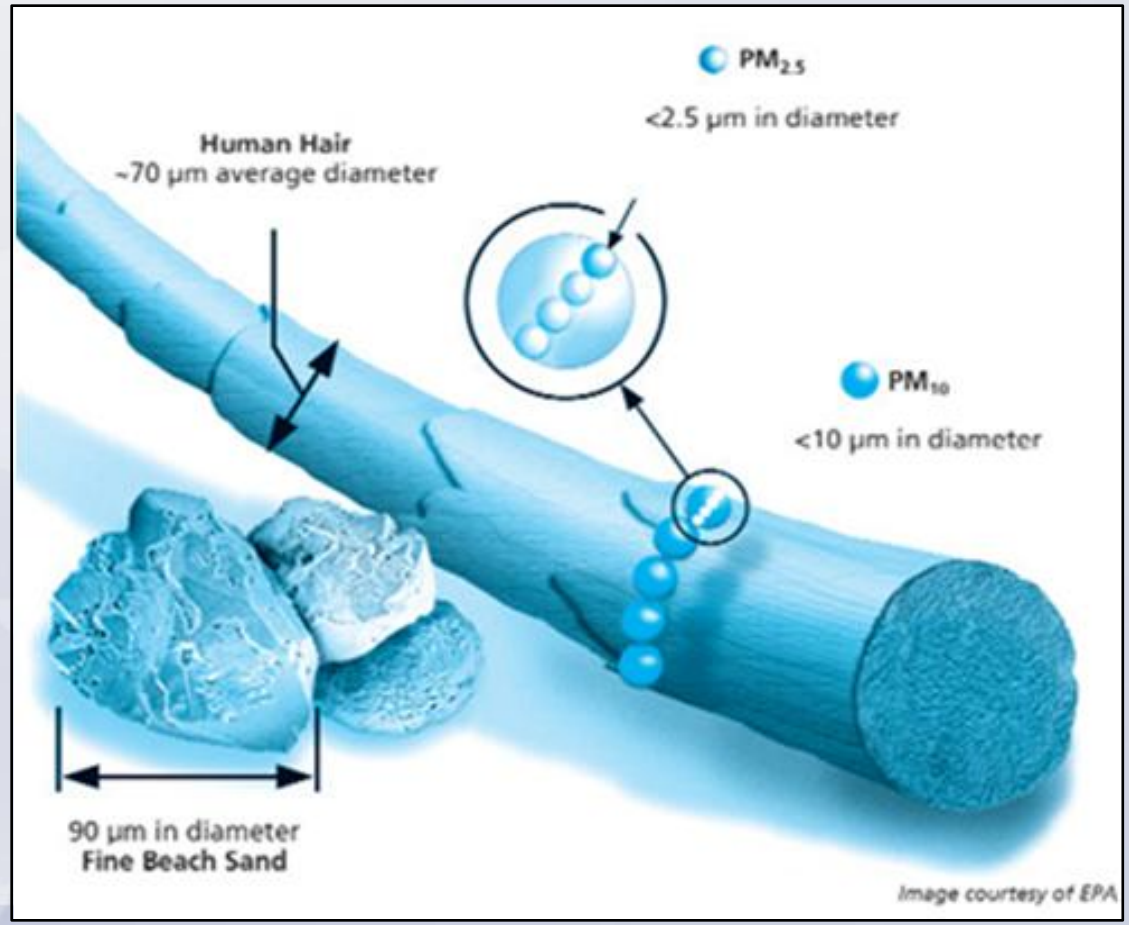
Particulate Matter

- What is it?
  - A complex mixture of particles and liquid droplets found in the air
  - Categories:

    Coarse Particles (PM_{10})

    Fine Particles ($PM_{2.5}$)



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Fine Particles

- Where do they come from?
  - Primary Emissions are directly emitted from a source
    - Coal-fired power plants
    - Construction sites
    - Industrial processes
    - Diesel engines
  - Secondary Emissions are formed when gases, such as SO_2 and NOx, react in the air
    - Coal-fired power plants
    - Industrial processes
    - Gasoline and diesel engines

Louisville METRO

How can your business help improve Louisville's air quality?

KPPC
Kentucky's Resource Center for Environmental Sustainability

J.B. Speed School of Engineering University of Louisville

Managing Buildings and Grounds for Air Quality

May 25, 2010

Bob Miles
Senior Sustainability Engineer

Cheryl Eakle
Sustainability Engineer

Victoria Kmiec
Student Engineer

What is KPPC?

- KPPC is a non-profit organization established in 1994 through a state legislative mandate
- Provides statewide technical assistance & outreach programs
- Based at the *U of L's J.B. Speed School of Engineering*
- Represents the *University* as a nationally recognized Center of Excellence
- Provides hands-on training for students through the Cooperative Education Program at SSoE

Core Programs:

- Environmental Sustainability
- Kentucky Energy Efficiency Program for Schools
- Kentucky Renewable Energy Consortium

KPPC

Mission

KPPC is Kentucky's primary resource to help businesses, industries and other organizations develop environmentally sustainable, cost-saving solutions for improved efficiency.

Based at the University of Louisville J.B. Speed School of Engineering, KPPC provides technical information and assistance that is free, confidential and non-regulatory.

KPPC
Kentucky's Resource Center for Environmental Sustainability

J.B. Speed School of Engineering University of Louisville

Grounds Maintenance and Vehicle Operations

Victoria Kmiec

Student Engineer

Paint

- What to look for?
  - ✓ Low VOC (Volatile Organic Chemicals)
  - ✓ Latex based
    - Can be thinned with water
    - Cleaned with soap and water
- Why eco friendly paint?
  - ✓ Increases indoor air quality
  - ✓ Lowers water toxicity
- Plan outside of “ozone season”
  - ✓ March-October

Green Purchasing

- Cleaning Products

  - ✓Natural ingredients
  - ✓Green cleaning services

- Business/Office Supplies

  - ✓Made from recycled materials
  - ✓Buying from local businesses

- U.S. EPA Environmentally Preferable Purchasing (EPP) www.epa.gov/epp

Grounds Upkeep

- Maintain grounds equipment
- Landscaping
  - ✓ Local nurseries
  - ✓ Use Louisville/KY native plants
    - Low maintenance
  - ✓ Prevents flooding and runoff
  - ✓ Good insulators
  - ✓ Organic fertilizers and composting
    - Don't over fertilize
- Air Quality Alert Days
  - ✓ Avoid using gas-powered equipment


Black-eyed Susan


Lambs Ear

Vehicles

- Ways to get to work
  - ✓ Public transportation/carpool
  - ✓ Bike or walk
- Regular vehicle maintenance
- Plan efficient routes
  - ✓ Combine errand into one trip
- Idling
  - ✓ Establish policy

  - ✓ Idling greater than 10 seconds uses more fuel than restarting the engine (California Energy Commission)

IDLING = ZERO MPG

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Improving the Energy Efficiency of your Facility

Cheryl Eakle

Sustainability Engineer

Utility Bills

- Determine a "baseline" of energy usage for all facilities
  - ✓ Identify high usage facilities
    - Electricity, natural gas, water
  - ✓ Identify energy saving opportunities for these facilities
  - ✓ Develop and continue to track energy benchmarks
    - Costs ($/production unit, $/ft^2)
    - Energy (kBtu/ft^2, kBtu/production unit)
    - Demand (kW/mo) (If Applicable)

Identify Opportunities

- ❑ Perform Energy Audit
  - ✓ Identify and form an energy audit team
    - Facility Personnel
      - Energy manager (leads team)
      - Plant manager/owner
      - Maintenance
      - Production
      - Billing/accounting
    - Equipment Vendors and Suppliers
    - Technical Assistance Provider or Consultant

Identify Opportunities (cont.)

- Determine Goals & Metrics
  - ✓ Lower energy bills (usage and demand)
  - ✓ Lower operating and maintenance (O&M) costs
  - ✓ Improve employee comfort & indoor air quality
  - ✓ Reduce environmental impact

Identify Opportunities (cont.)

- Gather site data information
  - ✓ Lighting count
  - ✓ Read equipment nameplates
  - ✓ HVAC data
  - ✓ Production data
  - ✓ Equipment operating schedules
  - ✓ Motor survey
  - ✓ Equipment utilizing natural gas
  - ✓ Plug load count of office equipment, break room equipment, etc.
  - ✓ Known energy issues

Identify Opportunities (cont.)

- Identify energy conservation measures (ECMs)
  - ✓ Brainstorm opportunities
  - ✓ Include both energy and cost savings
  - ✓ Prioritize & rank opportunities
- Determine payback on ECMs

Energy Opportunities

- **No Cost**
  - ✓ Incidental activities
  - ✓ No purchases required
  - ✓ Minimal labor required
- **Low Cost**
  - ✓ Purchases within existing O&M budget
  - ✓ Some dedicated labor needed
- **Capital Cost**
  - ✓ Sometimes it takes money to save money

Establish a Plug Load Plan

- PC power settings/security patch management
- Vending machine power control
- Standby power
  - ✓ Use of power strips
  - ✓ Unplug if not using
  - ✓ Office equipment
  - ✓ ENERGY STAR rated
- Seasonal shutdown
- Refrigerators
- Kitchen equipment
- Water heaters

Ensure Key Maintenance Activities Are Performed

- For Example: HVAC
  - ✓ Filter changing/cleaning
  - ✓ Fan belt replacements
  - ✓ Coil cleaning
  - ✓ AC condensation drip pans
  - ✓ Duct leak prevention

Provide Energy Efficiency Training

- Types of Training
  - ✓ **Awareness** – policies, practices, projects, general concepts
  - ✓ **Education** – methods, techniques, procedures, technical concepts
  - ✓ **Job-specific technical** – maintenance, operations, custodians, food service, admin
  - ✓ **Task-specific technical** – designated person, checklist, specific instructions, schedule

Assign Responsibility for Common Areas

- ❑ Hallways
- ❑ Multi-purpose rooms
- ❑ Cafeterias
- ❑ Auditoriums
- ❑ Restrooms
- ❑ Production areas
- ❑ Meeting areas
- ❑ Warehouse
- ❑ Storage areas

ACME Company Common Areas Checklist	
Space:	Office Area
Monitor:	Anita Jones
X	Lights
X	Doors/Windows
N/A	Computers
X	Temperature Settings
N/A	Water Fixtures
N/A	Exhaust Fans
Notes:	

Upgrade Lighting

- Incandescents to CFLs
- Lighting controls (timers, sensors)
- T-12s to T-8s
  - ✓ About a 20% reduction in power requirements
- T-5 high-bay lighting (e.g. warehouses)
- LED

Install Timers & Occupancy Sensors

- Vending machines have a captive audience
  - ✓ Why light them?
- Lighting occupancy sensors

Application	Energy Savings
Offices (Private)	25-50%
Offices (Open Spaces)	20-25%
Rest Rooms	30-75%
Corridors	30-40%
Storage Areas	45-65%
Meeting Rooms	45-65%
Conference Rooms	45-65%
Warehouses	50-75%

Replace Exit Signs With LED

- Can be done with in-house maintenance staff
- Add to your Preventative Maintenance program
- Can be done in conjunction with retrofit projects
- Life cycle is more than 10+ years
- You probably have more than you think, and the savings are 24/365

Exit Lamp Type	Lamp Life	Energy Usage (kWh/yr)	Cost ($0.06/kWh)	Lamp Cost	10 yr Operating Cost
Incadescent	2.8 months	350	$21.00	$2	$295.72
Fluorescent	10.8 months	140	$8.40	$5	$139.50
LED	**10+ years**	**44**	**$2.64**	**$10**	**$36.40**

Install Programmable Thermostats

- Identify good candidate areas
  - ✓ Conference rooms
  - ✓ Cafeterias
  - ✓ Other common areas
- Check for compatibility with HVAC system
- Ensure optimal settings, setbacks, and time scheduling
- Consider reasonable overrides

Every 1 F ≈ 1% Savings

Establish a Recognition Program

- Appreciation for ideas and hard work
- Award ceremonies for visibility
- Recognition at staff meetings
- Everyone begins to see saving energy as a priority

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- **www.kppc.org**

How do emissions of air pollution impact our community?

Louisville METRO

National Ambient Air Quality Standards (NAAQS)

- US EPA sets national standards for common pollutants
  - Health-based standards
  - Reviewed periodically
- Consequences of nonattainment
  - Loss of economic development opportunities
  - Restrictive permitting requirements
  - Loss of federal highway and transit funding

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NAAQS Attainment

May 2010 Status

Pollutant	Standard	Averaging Time	Attainment Status
Carbon Monoxide	9 ppm	8-hour	Attainment
	35 ppm	1-hour	Attainment
Lead	0.15 µg/m^3	Rolling 3-Mo Average	Attainment
	1.5 µg/m^3	Quarterly Average	Attainment
Nitrogen Dioxide	0.053 ppm	Annual Average	Attainment
	0.10 ppm	1-hour	Attainment
Particulate Matter (PM10)	150 µg/m^3	24-hour	Attainment
Particulate Matter (PM2.5)	15.0 µg/m^3	Annual Average	Nonattainment
	35 µg/m^3	24-hour	Attainment
Ozone	0.08 ppm	8-hour	Attainment
Sulfur Dioxide	0.03 ppm	Annual Average	Attainment
	0.14 ppm	24-hour	Attainment

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NAAQS Revisions

	Lead	NOx	SO_2	Ozone	PM	CO
Final	✓	✓				
Proposed			✓	✓		
Under Review					✓	✓

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NAAQS Attainment

Anticipated Status

Pollutant	Standard	Averaging Time	Attainment Status
Carbon Monoxide	9 ppm	8-hour	Attainment
	35 ppm	1-hour	Attainment
Lead	0.15 µg/m^3	Rolling 3-Mo Average	Status Uncertain
	1.5 µg/m^3	Quarterly Average	Attainment
Nitrogen Dioxide	0.053 ppm	Annual Average	Attainment
	0.10 ppm	1-hour	Status Uncertain
Particulate Matter (PM10)	150 µg/m^3	24-hour	Attainment
Particulate Matter (PM2.5)	10.0 to 14.0 µg/m^3	Annual Average	Nonattainment
	25 to 35 µg/m^3	24-hour	Status Uncertain
Ozone	0.060 to 0.070 ppm	8-hour	Nonattainment
Sulfur Dioxide	0.050 to 0.10 ppm	1-hour	Nonattainment

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Poised for Progress

- Our community has a history of success in meeting air quality challenges
- Strong knowledge base exists among stakeholders and residents
- Attainment will require changes by all
- The need for innovative solutions is urgent

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Air Quality Alerts

- Air Quality Alerts are called for days when air quality is forecasted to be in the Unhealthy for Sensitive Groups range and above
- Use Air Quality Alerts for:
  - Planning daily activities
  - Adjusting project schedules
- Sign-up for the KAIRE Network to receive alerts by email

KAIRE
www.helptheair.org

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Clearing the Air

A Seminar Series

	Day Seminars	Evening Seminars
March 30th	Air Quality 101	Air Quality 101
May 25th	Managing Buildings and Grounds for Air Quality *with special guest Kentucky Pollution Prevention Center*	Lawn Care for Cleaner Air
June 29th	Idle Reduction Tool Kit: Turn the Key for Cleaner Fleets	You and Your Car: The Key to Cleaner Air and Greater Fuel Efficiency
July 27th	Commercial Energy Efficiency *with special guest LG&E*	Residential Energy Efficiency *with special guest LG&E*
Aug. 31st	It All Adds Up: A Guide To Air Monitoring	It All Adds Up: A Guide To Air Monitoring
Sept. 28th	State of the Air *with Executive Director Lauren Anderson*	State of the Air *with Executive Director Lauren Anderson*

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For more information please visit

www.louisvilleky.gov/APCD

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